Extreme Rainfall Detection System (ERDS)

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OUTLINE

- 1. ITHACA overview
- 2. ERDS Aim and Datasets
- 3. ERDS live demo
- 4. Case studies
- 5. ERDS operational applications

1. ITHACA Overview

ITHACA

INFORMATION TECHNOLOGY FOR HUMANITARIAN ASSISTANCE, COOPERATION AND ACTION

Non-profit association







MISSION AND COMPETENCES

Provide scientific analysis and services to the WFP and the broader humanitarian community in support of environmental emergencies for disaster preparedness and response



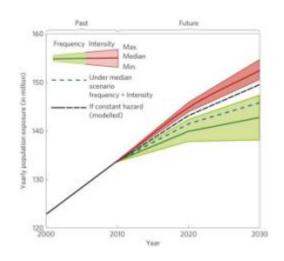
- 1. remote sensing
- 2. hydrology
- 3. meteorology
- 4. cartography
- 5. GIS

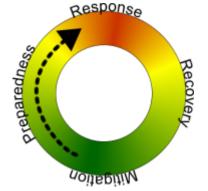
2. ERDS Aim and Datasets

THE CONTEXT

Meteorological hazards are increasing in frequency and in damage potential

Monitoring and forecasting of severe weather events allow more effective emergency preparedness and response





Early Warning Systems are not often publicly available especially in developing countries

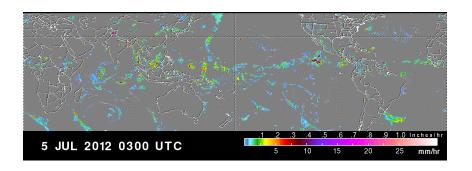
ERDS – Extreme Rainfall Detection System

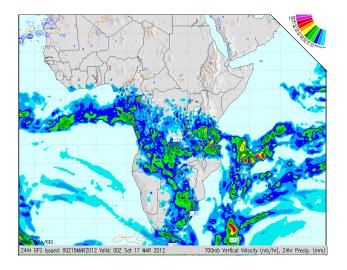
The Extreme Rainfall Detection System (ERDS) is a service aimed at providing timely and easy to understand alerts related to exceptional rainfalls and potential flood events at global scale.

INPUT DATA

- 1. Tropical Rainfall Measuring Mission (TRMM) Multisatellite Precipitation Analysis (TMPA) necessary for the near-real time detection of heavy rainfall (0.25° spatial resolution)
- 2. NOAA-GFS (Global Forecast System) deterministic model necessary for forecasted precipitation alerts (0.5° spatial resolution)

OPEN SOURCE DATA

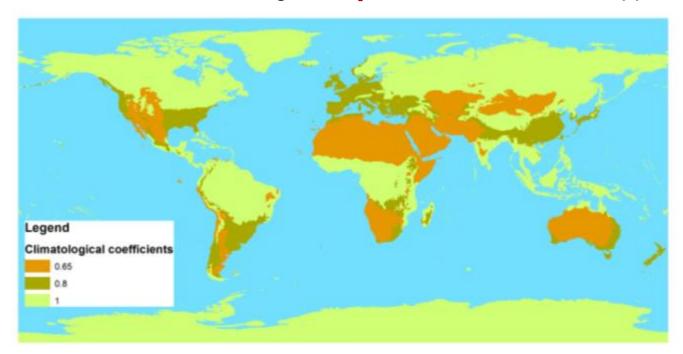




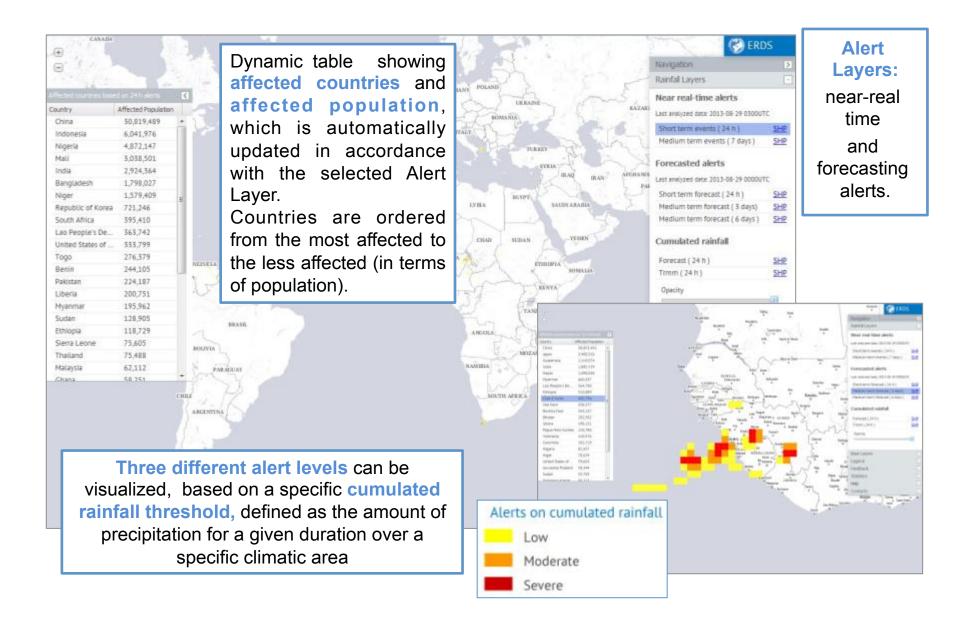
ELABORATION

Automatic procedure for the:

- 1. calculation of accumulated rainfall
- 2. correction of rainfall thresholds with climatological coefficients
- 3. identification of alerts using climatological rainfall thresholds
- 4. dissemination of alerts through an open-source WebGIS application



http://erds2.ithacaweb.org/



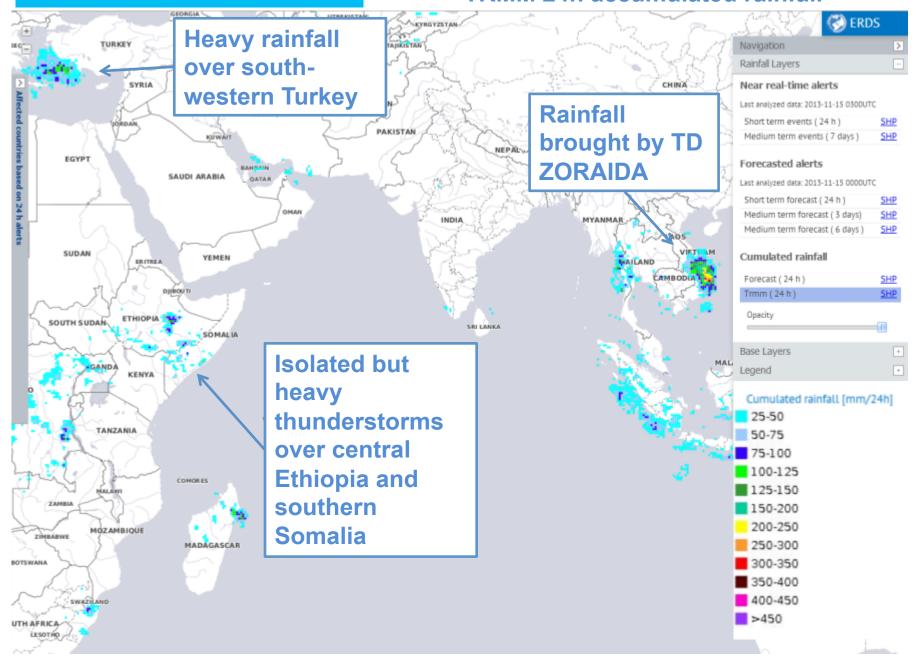
3. ERDS Live demo

ERDS application:

http://erds2.ithacaweb.org/

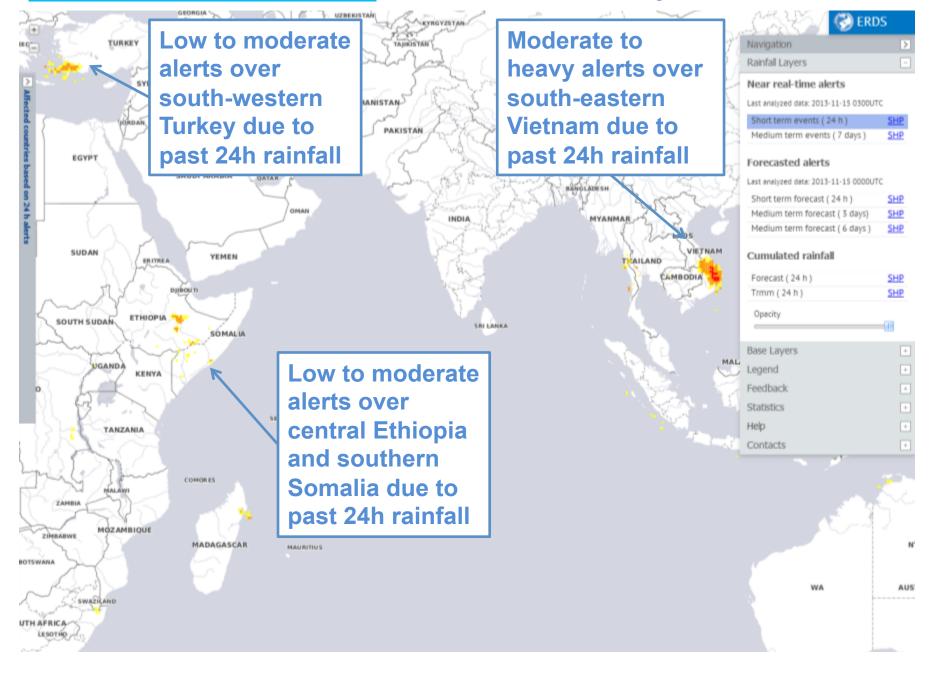
ERDS AS OF 15/11/2013

TRMM 24h accumulated rainfall



ERDS AS OF 15/11/2013

TRMM 24h heavy rainfall alerts



ERDS AS OF 15/11/2013 **TRMM 7 days heavy rainfall alerts** No specific No specific TURKEY Navigation issues based on 7 Rainfall Layers issues based on 7 Near real-time alerts days accumulated days accumulated Last analyzed data: 2013-11-15 0300UTC rainfall Short term events (24 h) rainfall Medium term events (7 days) EGYPT Forecasted alerts Last analyzed data: 2013-11-15 0000UTC BANGLADESH Short term forecast (24 h) SHP MANO Medium term forecast (3 days) SHP MYANMAR Medium term forecast (6 days) VIETNAM SUDAN Cumulated rainfall YEMEN ERITREA CAMBODIA Forecast (24 h) SHP Trmm (24 h) SHP Opacity ETHIOPIA SOUTH SUDAN SOMALIA Base Layers **Moderate to heavy** Legend KENYA alerts over northern Feedback Statistics and eastern Somalia Help TANZANIA due to effects of Contacts **Cyclone THREE** COMORES ZAMBIA MOZAMBIQUE ZIMBABWE MADAGASCAR MAURITIUS BOTSWANA AUS SWAZIKAND UTH AFRICA

ERDS AS OF 15/11/2013 GFS 24h forecasted rainfall alerts (%) ERDS ^ KYRGYZSTAN-AZER BAIJAN TÜRKMENISTÄN TURKEY TAJIKISTAN Navigation Rainfall Layers 24h forecasted SYRIA Near real-time alerts AFGHANISTAN IRAQ Last analyzed data: 2013-11-15 0300UTC rainfall alerts IRAN Short term events (24 h) SHP PAKISTAN Medium term events (7 days) SHP due to TD EGYPT Forecasted alerts **ZORAIDA** SAUDI ARABIA OATAR Last analyzed data: 2013-11-15 0000UTC Short term forecast (24 h) OMAN Medium term forecast (3 days) SHP MYANMAR Medium term forecast (6 days) SHP SUDAN Cumulated rainfall YEMEN ERITREA THAILAND CAMBODIA Forecast (24 h) SHP DJIBOUTI Trmm (24 h) SHP Opacity ETHIOPIA SOUTH SUDAN SOMALIA Base Layers Legend KENYA Moderate to heavy Feedback showers/thunderstorms Statistics Help TANZANIA over central Ethiopia Contacts COMORES ZAMBIA MOZAMBIQUE ZIMBABWE MADAGASCAR MAURITIUS BOTSWANA AUS SWAZILAND

UTH AFRICA

ERDS AS OF 15/11/2013 **GFS 3 days forecasted rainfall alerts** ERDS AZER BAIJAN TÜRKMENISTÄN 3 days TURKEY TAJIKISTAN Navigation Rainfall Layers forecasted SYRIA Near real-time alerts rainfall alerts AFGHANISTAN IRAQ Last analyzed data: 2013-11-15 0300UTC IRAN Short term events (24 h) SHP due to TD PAKISTAN Medium term events (7 days) SHP **ZORAIDA** EGYPT Forecasted alerts SAUDI ARABIA DATAR Last analyzed data: 2013-11-15 0000UTC BÂNGLADESH Short term forecast (24 h) SHP OMAN Medium term forecast (3 days) SHP MYANMAR Medium term forecast (6 days) SHP SUDAN Cumulated rainfall YEMEN ERITREA THAILAND CAMBODIA Forecast (24 h) SHP DJIBOUTI Trmm (24 h) SHP Opacity ETHIOPIA SOUTH SUDAN SÓMALIA Base Lavers Legend Low risk of heavy KENYA Feedback rainfall over central Statistics Help TANZANIA **Ethiopia during** Contacts following 3 days COMORES ZAMBIA MOZAMBIQUE ZIMBABWE MADAGASCAR MAURITIUS BOTSWANA AUS

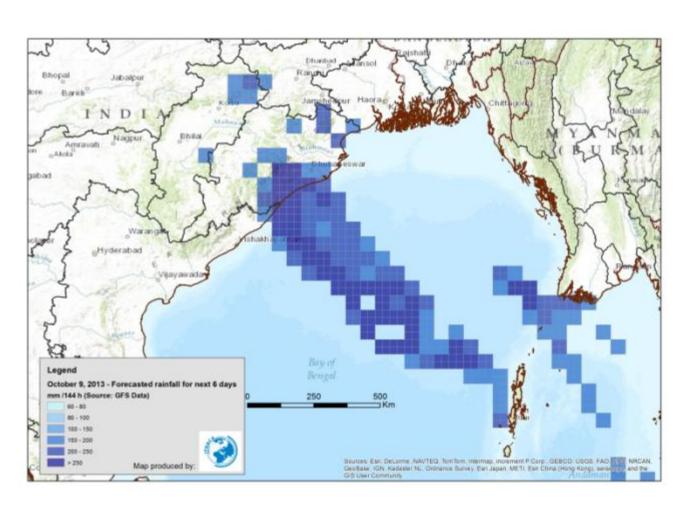
UTH AFRICA

ERDS AS OF 15/11/2013 GFS 6 days forecasted rainfall alerts ERDS AZER BAIJAN TÜRKMENISTÄN TURKEY 6 days TAJIKISTAN Navigation Rainfall Layers forecasted SYRIA Near real-time alerts rainfall alerts AFGHANISTAN IRAQ Last analyzed data: 2013-11-15 0300UTC IRAN Short term events (24 h) SHP due to TD PAKISTAN Medium term events (7 days) SHP EGYPT **ZORAIDA** Forecasted alerts SAUDI ARABIA Last analyzed data: 2013-11-15 0000UTC Short term forecast (24 h) SHP OMAN Medium term forecast (3 days) SHP MYANMAR Medium term forecast (6 days) SUDAN Cumulated rainfall YEMEN ERITREA THAILAND CAMBODIA Forecast (24 h) SHP DJIBOUTI Trmm (24 h) SHP Opacity ETHIOPIA SOUTH SUDAN SRILLANKA SOMALIA Base Layers MALDIVES UGANDA Legend KENYA Low risk of heavy Feedback Statistics rainfall over central Help TANZANIA **Ethiopia during** Contacts following 6 days COMORES ZAMBIA MOZAMBIQUE ZIMBABWE MADAGASCAR MAURITIUS BOTSWANA WA AUS SWAZILAND UTH AFRICA LESOTHO

4. Case studies

1. INDIA – Analysis of Cyclone PHAILIN (October 12, 2013)

October 9, 2013 GFS Forecasted accumulated rainfall for the next 6 days



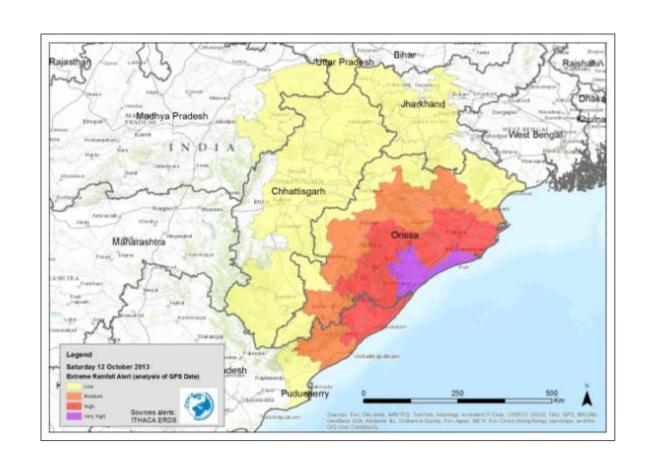
Following layers have been downloaded from ERDS web-site as shape-files:

- -24h GFS forecast
- -24h GFS alerts
- -3 days GFS alerts
- -6 days GFS alerts

1. INDIA – Analysis of Cyclone PHAILIN (October 12, 2013)

October 10, 2013 Alert map by administrative districts

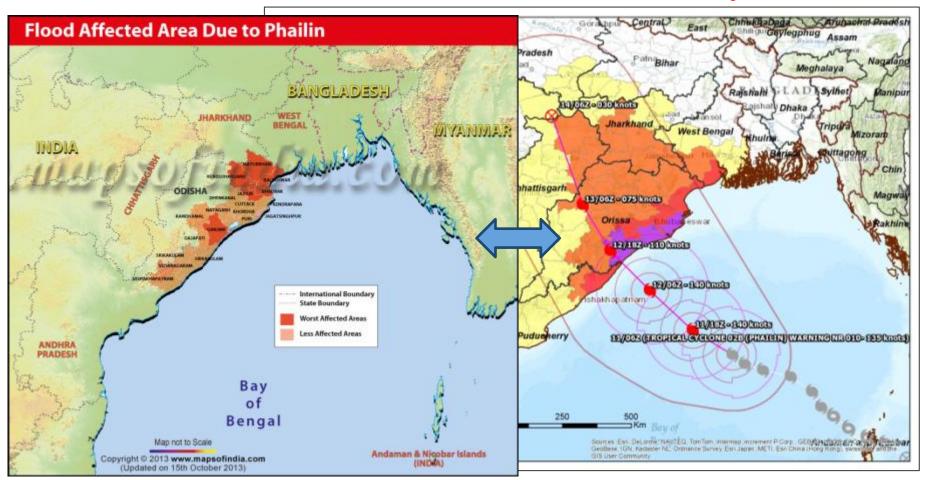
Making an INTERSECTION of downloaded shape-files with administrative districts layers a warning map has been produced and disseminated to end-users



1. INDIA – Analysis of Cyclone PHAILIN (October 12, 2013)

Post-event map

October 11, 2013
Alert on administrative districts + cyclone track



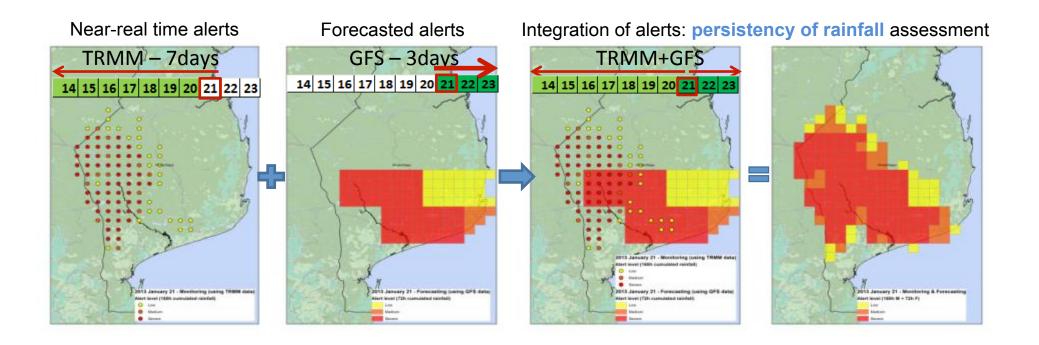
2. MOZAMBIQUE (14 - 23 January 2013)

- ✓ Flood event: 14-23 January 2013
- ✓ Analysis of archived TRMM and GFS cumulated rainfall
- ✓ Aggregation of near-real time and forecasted rainfall over the same areas
- ✓ Effective alert dissemination using reference data-sets

2. MOZAMBIQUE (14 - 23 January 2013)

RAINFALL ANALYSIS AND FORECASTING (SITUATION AS OF 21 JANUARY 2013)

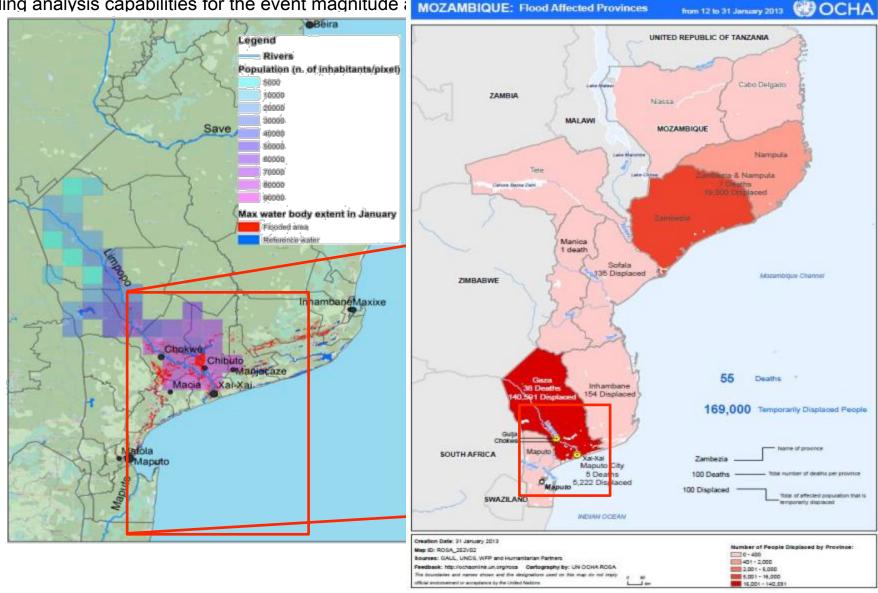
Aggregation of near-real time and forecasted rainfall over the same areas



2. MOZAMBIQUE (14 - 23 January 2013)

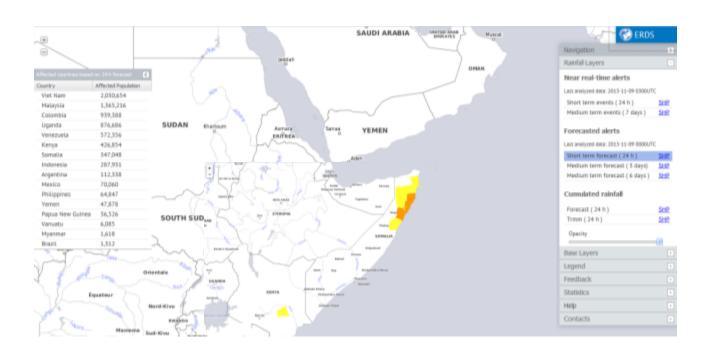
MAGNITUDE AND VULNERABILITY ASSESSMENT

Providing analysis capabilities for the event magnitude MOZAMBIQUE: Flood Affected Provinces



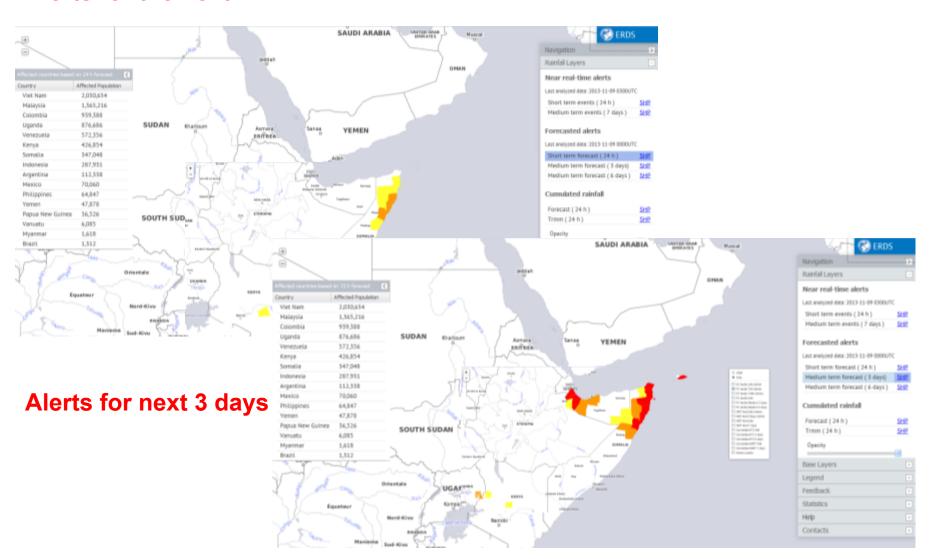
3. SOMALIA – Analysis of Tropical Cyclone THREE

November 9, 2013 Alerts for the next 24h

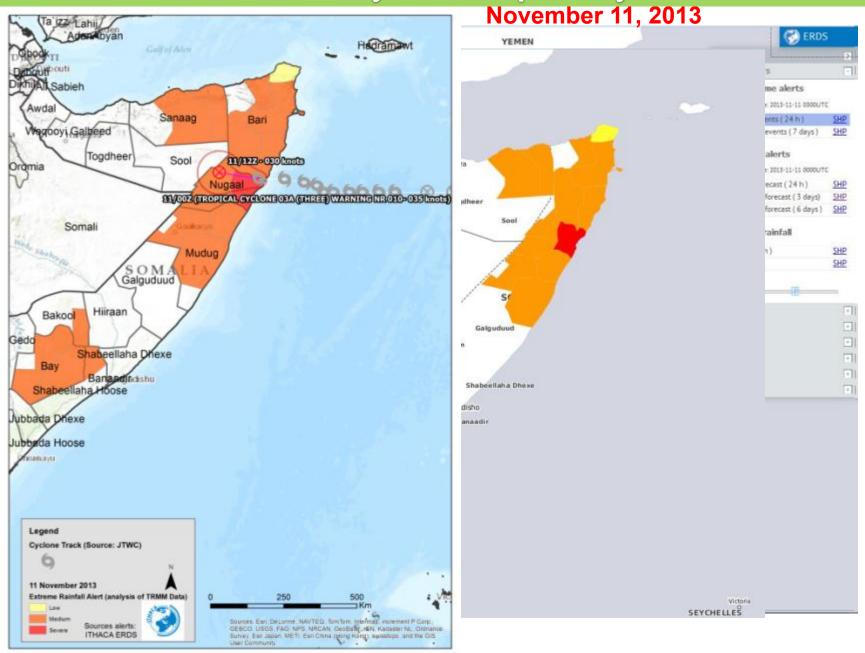


3. SOMALIA – Analysis of Tropical Cyclone THREE

November 9, 2013 Alerts for the next 24h



3. SOMALIA – Analysis of Tropical Cyclone THREE



5. ERDS operational application

Thanks to ERDS further collaborators:

ERDS would not have been available without the help of:

Piero Boccardo – ITHACA Director

Simone Dalmasso – ERDS development

Paolo Pasquali – ERDS front-end development

Simone Balbo - ERDS back-end development

Eros Agosto - ERDS back-end development

Federico Cuatto - ERDS development support

Andrea Ajmar – Database administrator

Walther Camaro - Data analyst

... and thank you for your attention!



To contact the ITHACA Early Warning Team: flood.alerts@ithacaweb.org

ERDS application:

http://erds2.ithacaweb.org/